

FIRST RECORD OF THE GENUS *ORFELIA* FROM CHINA, WITH DESCRIPTIONS OF THREE NEW SPECIES (DIPTERA: KEROPLATIDAE)¹

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ABSTRACT: Three new species of the genus *Orfelia* Costa are described from China: *O. baihuanzhuensis* Cao et Xu, n. sp.; *O. helvola* Cao et Xu, n. sp.; *O. maculata* Cao et Xu, n. sp.. These new species belong to the *O. nemoralis* Meigen group. A key to Chinese species of *Orfelia* is given to aid in their identification.

KEY WORDS: Keroplatidae, *Orfelia*, taxonomy, new species, China

Orfelia Costa, 1857 is a rather large genus in the tribe Orfeliini of the Keroplatinae, according to the recent world catalogue of Keroplatidae (Evenhuis, 2006), this genus includes 43 described species. Of these, half of the species are known from the Palaearctic Region and seven species are known from the Oriental Region.

This is the first report of the genus *Orfelia* from China. Three new species were found among the specimens deposited in the entomological collection of Zhejiang Forestry College, Lin'an, Zhejiang, China (ZJFC). Undoubtedly, this is a significant addition to the knowledge of the genus *Orfelia* in Southeast Asia. However, China includes areas belonging to both the Palaearctic and Oriental Regions, so there are more species awaiting discovery.

The genus is distinguished from other related genera by the following characters: branches of medial and cubital veins bare dorsally; tibia with about 6 rows of setae much more closely set than others, appearing as conspicuous black lines; mesonotum uniformly setose, mediotergite with many short hairs.

METHODS

The material was collected by sweeping and Malaise traps and preserved in 80% ethanol. The specimens were determined mainly by genital characters, which were treated in the standard way (heating in a solution of 10% KOH followed by neutralization in acetic acid and washing in distilled water). The genitalia were placed into glycerin for detailed study and later preserved as glycerin

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preparations. All material in this study is deposited in ZJFC. Morphological terminology follows that of Sølvi et al. (2000).

Key to the species of *Orfelia* known from China

1. Crossvein r-m fusion longer than petiole M (Fig. 2).....*O. maculata* Cao et Xu, n. sp.
- . Crossvein r-m fusion shorter than petiole M (Figs. 1, 3).....2
2. Tergite IX subequal in length to gonocoxites (Fig. 11).....*O. helvola* Cao et Xu, n. sp.
- . Tergite IX tapered from base to apex, about 1.5 times as long as gonocoxites (Fig. 5).....*O. baishanzuensis* Cao et Xu, n. sp.

SYSTEMATIC ENTOMOLOGY

Orfelia baishanzuensis Cao et Xu, n. sp.

(Figs. 1, 4-6)

Diagnosis. This species is similar to *O. nemoralis* (Meigen, 1818) (Hutson et al., 1980). However, it is easily distinguished by palpal segments long (short and rounded in *O. nemoralis*), very faint brown shade apically from costa to middle of cell r5 (whole wing tip more or less evenly darkened in *O. nemoralis*) and the upper posterior lobe of gonostyli narrow, sclerotized and toothlike (broad and not sclerotized in *O. nemoralis*). The shape of gonostyli is also a good character to distinguish it from the other two Chinese species of the genus.

Description. Male. Lengths: Body: 5.5 mm; wing: 4.4 mm. **Head.** Yellowish brown. Antennae: scape and pedicel cup-shaped, obscurely yellow. Flagellum: first flagellomere yellowish brown, obscurely yellow basally; remaining flagellomeres yellowish brown; terminal flagellomere with a small papilla. Palpi yellow to obscurely yellow, terminal palpomere long.

Thorax. Mesonotum yellowish brown; patch of thick black setae above wing root. Scutellum obscurely yellow with a row of long dark setae on posterior margin. Prothorax yellow with some long setae. Anepisternum and katepisternum yellow, bare; laterotergite obscurely yellow, bare; mediotergite yellowish brown, with a few black setae apically. Halter yellow.

Legs. Yellow. Fore tibia without setae and comb, mid tibia with setae and posterior comb, hind tibia with setae and anterior comb and posterior comb. Tibial spurs dark brown. Fore, mid and hind basitarsi 0.7x lengths of respective tibiae. Claws minute.

Wing (Fig. 1). Hyaline with very faint brown shade apically from costa to middle of cell r5. Veins dark brown. Costa slightly beyond the tip of R₅; Sc ends in C at level of 0.7-0.8 of distance between h and base of R₅; Sc-R situated at level of 0.3-0.4 of distance between h and tip of Sc. Distance between tips of R₁

and R_4 1.8-2.0 times as long as R_4 . Ratio of r-m fusion / petiole of M: 0.8-0.9. Petiole of M one-fifth as long as length of M_1 . vein A not reaching wing margin.

Abdomen. Tergites I-IV yellowish brown with yellow band on posterior half; tergites V-VII yellowish brown. Sternum yellow.

Hypopygium (Figs. 4-6). Tergite IX yellow, about 1.5 times as long as gonocoxites, with a bare stripe on medial area. Cercus concealed in dorsal view. Gonocoxites broad and bilobed, with black stiff setae on medial area and remaining area with uniform short setae; Gonostyli yellow, strongly swollen with three lobes apically, distal lobe dark brown, sclerotized and toothlike; medial lobe a smaller slightly sclerotized tooth; proximal lobe not sclerotized, with some black stiff ventral setae. Aedeagus with a pair of distinct apical projections, yellowish brown, almost reaching the level of the top of gonostyli and slightly bending inward apically in ventral view.

Female. Unknown.

Type Data: Holotype ♂ (ZJFC 940325) and paratypes ♂♂ from: China: Zhejiang province: Baishanzu National Natural Reserve, 20 Apr 1994, Hong Wu, Malaise traps.

Etymology. The species name refers to the type locality: Baishanzu National Natural Reserve.

Orfelia maculata Cao et Xu, n. sp.

(Figs. 2, 7-9)

Diagnosis. This species is similar to *O. baishanzuensis* n. sp. but distinguished from it by ratio of r-m fusion / petiole of M: 1.3-1.5 (0.8-0.9 in *O. baishanzuensis*), mesonotum usually with three dark brown stripes (absent in *O. baishanzuensis*) and gonostyli with two lobes at apex (with three lobes in *O. baishanzuensis*).

Description. Male. Lengths: Body: 5.7 mm; wing: 4.5 mm. **Head.** Yellowish brown. Antennae: scape and pedicel cup-shaped, obscurely yellow. Flagellum: first flagellomere yellowish brown, obscurely yellow basally; remaining flagellomeres yellowish brown to pale brown; terminal flagellomere with a small papilla. Palpi yellow to obscurely yellow, terminal palpomere long.

Thorax. Mesonotum yellow, usually with three dark brown stripes on disc, medial stripe not reaching pronotum; patch of thick black setae above wing root. Scutellum obscurely yellow with a row of long dark setae on posterior margin. Prothorax yellow with some long setae. Anepisternum yellow, with or without a little patch of short setae above; katepisternum and laterotergite yellow, bare; mediotergite yellowish brown to dark brown, with a few black setae apically. Halter yellow, knob pale brown.

Legs. Yellow. Fore tibia without setae and comb, mid tibia with setae and posterior comb, hind tibia with setae and anterior comb and posterior comb. Tibial spurs dark brown. Fore, mid, and hind basitarsi 0.8x lengths of respective tibiae. Claws minute.

Wing (Fig. 2). Hyaline with very faint brown shade apically from R_5 to mid of cell r_5 . Veins dark brown. Costa almost reaching one-third distance from vein R_5 to vein M_1 ; Sc ends in C at level of 0.6-0.7 of distance between h and base of Rs; Sc-R situated at level of 1/2 distance between h and tip of Sc. Distance between tips of R_1 and R_4 1.4-1.6 times as long as R_4 . Ratio of r-m fusion / petiole of M: 1.4-1.5. Petiole of M one-seventh as long as length of M_1 . vein A not reaching wing margin.

Abdomen. Tergite I dark brown; tergites II-III dark brown with yellow band on posterior third; tergites IV-V yellow with dark brown band on anterior third; tergites VI-VII obscurely yellow. Sternum yellow.

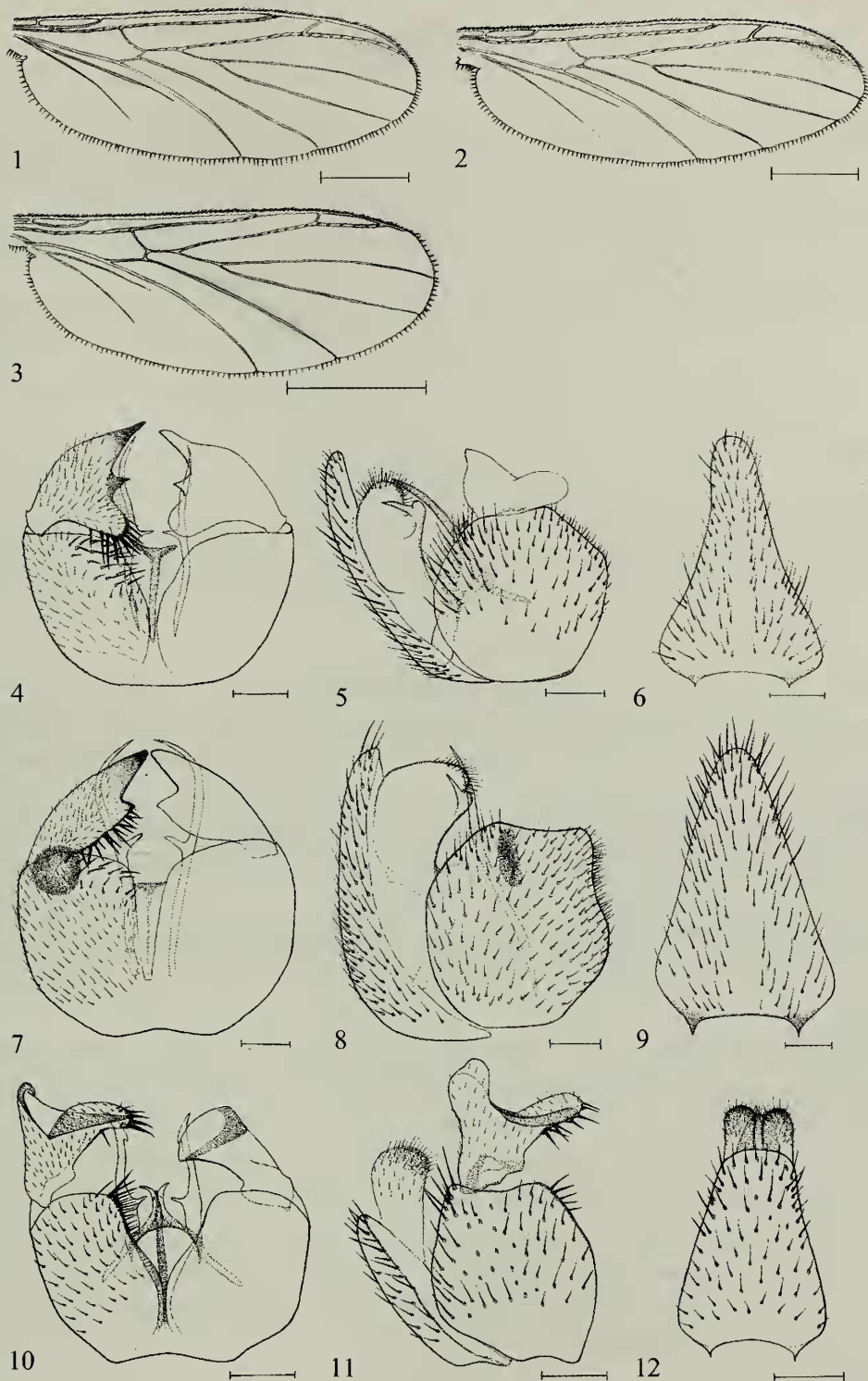
Hypopygium (Figs. 7-9). Tergite IX yellow, tapered from base to apex and 1.5 times as long as gonocoxites; with a bare stripe on medial area. Cercus concealed in dorsal view. Gonocoxites broad and bilobed, with black stiff setae on apical margin and remaining area with uniform short setae; two large round black spots (yellow medially) apically. Gonostyli yellow with two lobes apically, distal lobe black, sclerotized like tooth; proximal lobe not sclerotized, with some black stiff ventral setae. Aedeagus with a pair of distinct apical projections, brownish yellow, reaching the level of the top of gonostyli and curved inward apically in ventral view.

Female. Unknown.

Type Data.

Holotype ♂ (ZJFC 060021) and paratypes ♂♂ from: China: Zhejiang province: Wuyanling National Natural Reserve, 5 May 2006, Xiaoling Niu; Other paratypes: 2♂♂, Zhejiang province: Gutian Mountains, 14 Apr 1993, Hong Wu; 1♂, Zhejiang province: Tianmu Mountains, 10 Jun 1999, Mingshui Zhao, Malaise traps; 2♂♂, Zhejiang province: Baishanzu National Natural Reserve, 21 Apr 1994, Hong Wu; 2♂♂, Zhejiang province: Tianmu Mountains, 24 May 2006, Jian Cao, Malaise traps.

Etymology. The species name refers to gonocoxites with two large round black spots apically.



Figures 1-3. *Orfelia* wings. 1. *Orfelia baishanzuensis*, n. sp. 2. *Orfelia maculata*, n. sp. 3. *Orfelia helvola*, n. sp. Scale bar = 1.0 mm. Figures 4-6. *Orfelia baishanzuensis*, n. sp. 4. male terminalia, ventral view. 5. male terminalia, lateral view. 6. tergite IX, dorsal view. Scale bar = 0.1 mm. Figures 7-9. *Orfelia maculata*, n. sp. 7. male terminalia, ventral view. 8. male terminalia (gonostylus removed), lateral view. 9. tergite IX, dorsal view. Scale bar = 0.1 mm. Figures 10-12. *Orfelia helvola*, n. sp. 10. male terminalia, ventral view. 11. male terminalia, lateral view. 12. tergite IX, dorsal view. Scale bar = 0.1 mm.

***Orfelia helvola* Cao et Xu, n. sp.**

(Figs. 3, 10-12)

Diagnosis. This species is similar to *O. angulata* (Sasakawa, 1994), but it is easily distinguished by the fore basitarsus shorter than the fore tibia (subequal in *O. angulata*), gonostyli folded outward apically (not folded apically in *O. angulata*) and aedeagus with a pair of distinct apical projections, slightly bending outward apically in ventral view (bending inward in *O. angulata*).

Description. Male. Lengths: Body: 3.8 mm; wing: 3.0 mm. **Head.** Yellowish brown. Antennae: scape and pedicel cup-shaped, yellow. Flagellum: first flagellomere obscurely yellow, yellow basally; remaining flagellomeres obscurely yellow; terminal flagellomere with a small papilla. Palpi yellow.

Thorax. Mesonotum yellow with three brownish yellow stripes on disc, medial stripe extending anteriorly to pronotum; patch of thick black setae above wing root. Scutellum yellow with a row of long dark setae on posterior margin. Prothorax obscurely yellow with some long setae. Anepisternum, katepisternum and laterotergite obscurely yellow, bare; mediotergite obscurely yellow, with a few black setae apically. Halter yellow.

Legs. Yellow. Fore tibia without setae and comb, mid tibia with setae and posterior comb, hind tibia with setae and anterior comb and posterior comb. Tibial spurs brown. Fore, mid and hind basitarsi 0.7x lengths of respective tibiae. Claws minute.

Wing (Fig. 3). Hyaline with very pale brown shade apically. Veins brown. Costa extends slightly beyond the tip of R_5 ; Sc ends in C at level of 0.4-0.5 of distance between h and base of R_5 ; Sc-R absent. R_4 very short, distance between tips of R_1 and R_4 7.4-7.8 times as long as R_4 . Ratio of r-m fusion / petiole of M: 0.7-0.8. Petiole of M one-fifth as long as length of M_1 . Vein A not reaching wing margin.

Abdomen. Tergites I-III yellow; tergites IV-VII brownish yellow. Sternites I-IV yellow, sternites V-VII brownish yellow.

Hypopygium (Figs. 10-12). Tergite IX yellow, subequal in length to gonocoxites. Cercus visible in dorsal view, rounded apically. Gonocoxites yellow, broad and bilobed, with stiff black setae on medial margin and remaining area with uniform short setae; Gonostyli yellow, folded outward apically and with some stiff setae on the apex. Aedeagus with a pair of distinct apical projections, yellow, almost reaching the level of the top of gonostyli and slightly curved outward apically in ventral view.

Female. Unknown.

Type Data: Holotype ♂ (ZJFC 880591) and paratypes ♂♂ from: China: Yunnan province: Kunming city, Huahongdong, 20 Mar 1981, Chikun Yang.

Etymology: The species name refers to mesonotum with three brownish yellow stripes.

DISCUSSION

We have found most known species of *Orfelia* have narrowly curved and lanceolate gonostyli and very few species have large, rounded and lobed gonostyli as in these Chinese species. The unusual shape of the gonostyli in these species is a good character to distinguish them from the other species of the genus, while in the Palearctic, *O. nemoralis* (Meigen) comes closest to the shape of the specimens herein described. In our studies, we also have found some defective specimens with narrowly curved and lanceolate gonostyli, and we suspect that there are more species awaiting discovery in China.

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